CTN Test Report

92-018

AFTB-ID

92-012

Engineering Drawing Transfer Test

Using Magnavox Electronic Systems
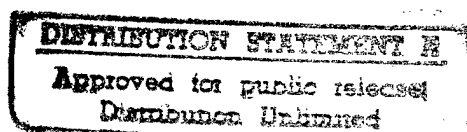
MIL-D-28000A (IGES)
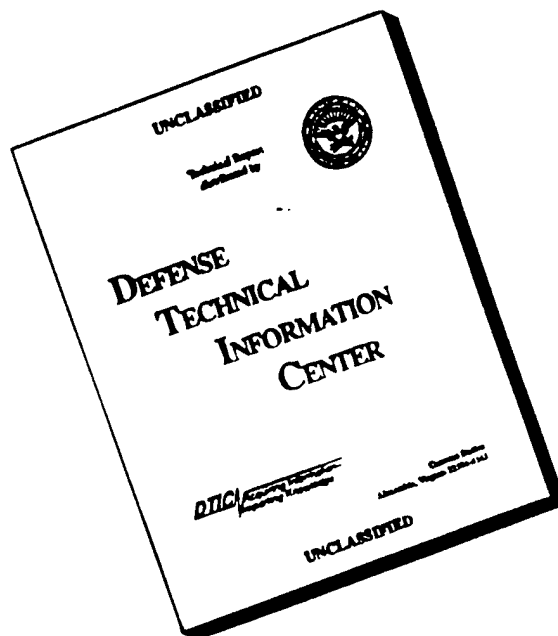
Quick Short Test Report

20 November 1992

Prepared for

Air Force Materiel Command

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Engineering Drawing Transfer Test

Using Magnavox Electronic Systems Company

MIL-D-28000 (IGES)

Quick Short Test Report

20 November 1992

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Contents

1. Introduction

1.1 Background

The DoD Computer-aided Acquisition and Logistics Support (CALS) Test Network (CTN) is conducting tests of the military standard for the Automated Interchange of Technical Information, MIL-STD1840A, and its companion suite of military specifications. The CTN is a DoD-sponsored confederation of voluntary participants from industry and government managed by the Air Force Materiel Command.

The primary objective of the CTN is to evaluate the effectiveness of the CALS standards for technical data interchange and to demonstrate the technical capabilities and operational suitability of those standards. Two general categories of tests are performed to evaluate the standards, formal and informal. Formal tests are large, comprehensive tests that follow a written test plan, require specific authorization from DoD, and may take months to prepare, execute, and report.

Informal tests are used by the CTN technical staff to broaden the testing base by including representative samples of the many systems and applications used by CTN participants. They also allow the CTN staff to gain feedback from many industry and government interpretations of the standards, to increase the base of participation in the CALS initiative, and to respond, in a timely manner, to the many requests for help that come from participants. Participants take part voluntarily and are benefited by receiving an evaluation of their latest implementation (interpretation) of the standards, interacting with the CTN technical staff, gaining experience in use of the standards, and developing increased confidence in them. The results of informal tests are reported in Quick Short Test Reports (QSTRs) that briefly summarize the standard(s) tested, the hardware and software used, the nature of the test, and the results.

1.2 Purpose

The purpose of the informal test reported in this QSTR was to analyze Magnavox's interpretation and use of the CALS standards in transferring CALS Class II IGES data. Magnavox used its CALS Technical Data Interchange System to produce data in accordance with the standards and delivered it to the CTN technical staff on a floppy disk. This test was conducted in conjunction with the Cincinnati IGES User Group meeting hosted by the Air Force CALS Test Bed (AFCTB). The files were created by Magnavox and sent to International TechneGroup Incorporated where the files were modified to meet MIL-D-28000A Class standards. It should be noted that MIL-D-28000A is only a draft at the time of this test. This test was run in conjunction with the Cincinnati IGES User Group meeting that was hosted by the AFCTB.

2. Test Parameters

Test Plan: AFTB 92-12

Date of Evaluation: 5 February 1992

Evaluator: George Elwood
                                  Air Force CALS Test Bed
                                  4027 Colonel Glenn Hwy
                                  Suite 200
                                  Dayton, OH 45431-1601

Data Originator: Magnavox Electronic Systems Company
                                  Don Schwegman
                                  1616 Production Road
                                  Fort Wayne, IN 46808

Data Description: IGES Transfer Test
                                          4 IGES files

Data Source System:

    IGES

                                  IBM IGES V2R3MO
                                  CADAM V3R1M1

Evaluation Tools Used:

MIL-D-28000 (IGES)
    SUN 3/60
                                  Rosetta Technology Preview V3.1
                                  IDA Igesview v2.0
                                  IDA IGES Parser
    SUN Sparc IPC
                                  ITI IGES/Works v1.0
    Intergraph
    CheetahGold 486
                                  AutoCAD 386 R11
                                  CADKEYV4.0
                                  IDA IGES Parser
                                  MES Solution 3000
                                  MES CheckMark V1.0

Standards Tested:

                                  MIL-D-28000A (Draft)

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3. 1840A Analysis

3.1 External Packaging

The floppy disk arrived at the AFCTB enclosed in a standard commercial floppy disk mailer. The exterior of the mailer was not marked with the required magnetic tape warning label, MIL-STD-1840A, para. 5.3.1.3.

Enclosed in the mailer was a packing list showing all files that were recorded on the floppy disk. The purpose of this test was to evaluate the files and not the packaging.

3.2 Transmission Envelope

The floppy disk received by the AFCTB contained MIL-D-28000A files. The files were not named per the standard conventions. The purpose of this test was to evaluate the files and not the transmission envelope.

3.2.1 Tape Formats

No tape to evaluate.

3.2.2 Declaration and Header Fields

The files on the floppy disk did not have header files. This was not evaluated during the test.

4. IGES Analysis

The floppy disk that arrived at the AFCTB contained four IGES files. The files had been created on the CADAM V3R1M1 System using IBM IGES V2R3M0 at Magnavox Electronic Systems Company. The files were sent to International TechneGroup Incorporated who used their *IGES/Works* software and modified the files so they met MILD28000A standards.

All four files were run through the same procedures. Only the first file will be discussed in detail as the errors are the

same for all four files. Hard copies of all four files are in-
cluded in the appendix to this report.

4.1 IDA Parser/Verifier

The first file named CALS21.IGS was run through IDA's *Parser* and
Verifier. The parser/verifier were set to check for CALS Class
II compliancy. Because the files were modified to meet the draft
28000A standard, the results were cross-checked against the most
current draft.

The parser reported an error with the maximum coordinate value
defined in the global section of the file. The parameter should
be zero but the parser appeared to pick the high number of zeros
in the field as something else. This is not a problem.

```
*  Maximum coordinate       =  0.000000E+000
ERROR   3008: CALS Class II does not allow maximum coordinate to be defaulted.
CAUTION 1080: Maximum coordinate value in data is to be zero.
```

The IDA *Verifier* was then run against the file. This program
reported several errors. The first error reported was the use of
an illegal IGES Specification. Both 28000 and the draft 28000A
permit versions IGES 3.0 or 4.0. The files call for IGES version
5.1.

```
Specification version = 8 (IGES 5.0)
ERROR   4048: Illegal specification version for CALS Class II specified.
```

The Verifier also reported the problem with the maximum
coordinate value. The next reported problem was the use of an
illegal form for entity 402. MIL-D-28000 permits the use of Form
3, 4, or 15 in this field. MIL-D-28000A will permit Forms 3, 4,
or 7. For the draft MIL-D-28000A this entry would be correct.
These were the only CALS Class II issues reported by the IDA
Parser/Verifier.

```
*** Entity type: 402
```

```
ERROR   4042: Illegal form for CALS Class II specified at D   1653.
```

402	1493	1	0	0	0	0	0	20300D	1653
402	0	0	1	7	^^^			D	1654

4.2 Other IGES Processors

When the files were run through the post-processor of the available CAD Software in the AFCTB, several differences were noted. The most apparent problem was the way the file was displayed. The file consisted of one drawing and several views. On the first and fourth file, there was nine views. If a drawing mode was selected, the images would look correct. The high end CAD Software, *Solution 3000*, *CheckMark*, and *Intergraph* default to the model mode. This resulted in the generation of unusable graphic displays. The result would be a basic drawing in one plane. The drawing border was displayed 90 degrees to the basic drawing. The views, which were details of parts of the drawing, were displayed   in   the lower left corner. These views were displayed in either of the planes and sometime reversed. By changing the mode from model to drawing, the reference drawing appeared correct.

4.2.1 Preview

Rosetta Technologies *Preview* generates and displays either mode. The normal method in the AFTB is to use the drawing or layout mode. This generated a correct image. By selecting the model mode, the image was displayed in the same manner as the other high end CAD Software.

4.2.2 Intergraph

The files were sent to the 4950th Modification Center which converted the files using an *Intergraph* workstation product. This system defaulted to the model mode and displayed the images as described above. Because of time constraints, no effort was made to convert the file to layout mode.

4.2.3 Solution 3000/CheckMark

The files were converted, displayed and printed by Moore Quality Tooling (MQT) in Centerville, Ohio using their Micro Engineering Solutions (MES) *Solution 3000* CAD Software. This software also defaults to the model mode. The designer at MQT did change the file to layout mode and plotted the file. The results were a normal usable engineering drawing.

The MES *CheckMark* Software, available in the AFTB, displayed the model mode as a default. The display was changed to layout mode and the result was the correct drawing.

4.2.4 AutoCAD R11

When the IGES file was converted using *AutoCAD R11*, several entities were reported as being non-supported. The resulting display and printout was judged as unusable. Parts of the file were not displayed, parts were displayed outside of the drawing boundary, and many boxes were displayed around the screen. These boxes relate to the views.

4.2.5 CADKEY V4.06

CADKEY's IGES translator completed the process without reported errors. It was noted that parts of the drawing were not displayed. The basic geometry was displayed but the dimensions and text were not displayed. These areas were noted in the views.

4.2.6 CADAM V3R1M1

When the basic file was evaluated, one error was noted. *CADAM* inserted the leaders backward in some areas. When the leader lines were drawn outside the dimension lines, *CADAM* would insert the lines inside. Using ITI's *IGES/Works* Software, the entities were extracted from the file for detailed evaluation. Shown below is part of the Directory and Parameter data for the entities in question.

```
216        2        0        1        0        0        0        0        0D        3 216
     1        0                                        D        4 212        3        0        1
     0        0        0  10100D        5 212        0        0        2        0
     D        6 214        5        0        1        0        0        0        0  10100D
     0        0        2        1                                D        8 └ Form 214
     0        1        0        0        0        0  10100D        9 214        0        0
     1                                D        10 106        9        0        1        0
                                0        0  10100D        11 106        0        0
     40                                D        12 106        11        0        1        0
     0        0  10100D        13 106        0        0        2        40
     D        14 216,5,7,9,11,13;                                                              3
     212,1,4,0.609376D0,0.164062D0,1,1.570796D0,3.4641020469255D-07,        5P        3
     0,0,-11.290698D0,27.508363D0,0.0D0,4H.057;        5P        4
          ┌ Height    ┌ width        ┌──────────┬── Start Point
214,1,0.148D0,0.052D0,0.0D0,-12.20591D0,27.590393D0,        7P        5
-11.343432D0,27.590393D0;        7P        6 └───
     End Point of leader line
214,1,0.148D0,0.052D0,0.0D0,-12.09191D0,27.590393D0,-12.20591D0,        9P        7 27.59
9P        8 106,1,3,0.0D0,-12.20591D0,26.906693D0,-12.20591D0,27.046693D0,        11P
-12.20591D0,27.740387D0;        11P        10
106,1,3,0.0D0,-12.09191D0,27.261749D0,-12.09191D0,27.401749D0,        13P        11
-12.09191D0,27.740387D0;        13P        12
```

It was noted that the right pointing arrowhead start point is shown on the left leader line where it should be on the right line. The reverse is true of the left pointing arrowhead. The arrowhead height and width are correct. The end of the leader line is correct.

The arrowhead type is form 1 which is a wedge. The detail from *CADKEY* shows the arrowhead as a triangle which is form 2.

5. SGML Analysis

No SGML files were included on the floppy disk.

6. Raster Analysis

No raster files were included on the floppy disk.

7. CGM Analysis

No CGM files were included on the floppy disk.

8. Conclusions and Recommendations

In summary, the MIL-STD-1840A files from Magnavox Electronic Systems were basically correct. The files were evaluated using an IGES parser and CALS Class II MIL-D-28000. The files had been created using the draft MIL-D-28000A specification. Using the current draft, only one error was encountered.

The major problem appeared to be how the CAD systems handled the file. The file contained a model/draw/view structure. Four of the CAD systems available in the AFTB used the file in the layout mode (equivalent to the model/draw/view structure). This generated an image that looked like an engineering drawing. CAD systems that imported the file as a model only, generated an image that was not usable until the mode was changed.

The AFTB would like to thank the 4950th Modification Center and Moore Quality Tooling for their assistance in completing this test.

9. Appendix A - IGES File One
9.1 IDA Parser Log

```
*** IGES DATA FILE PARSING ***
        ***          AUGUST 1991       ***
        ***    IGES Data Analysis      ***
        ***        (708) 449-3430      ***

  Input file is \mag\cals21.igs

  Checking conformance to CALS Class II

  Today is February 10, 1992  9:17 AM

 *** Count of Records Per Section in Data File ***


        Section          Records

        Start            42
        Global           4
        Directory        2572  (   1286 Entities)
        Parameter        2013
        Terminate        1



 *** Start Section From Input File:
```

CONFORMANCE: This IGES file conforms to the MIL-D-28000A Class II		S	1
subset (Engineering Drawings) dated December 19, 1990.		S	2
		S	3
DOD-STD-100 and MIL-T-31000 part and drawing identification:		S	4
		S	5
Revision letters:		S	6
		S	7
Performing organization:		S	8
		S	9
Date of the ASME Y14.26M file pre-processing:		S	10
		S	11
Contract Number:		S	12
		S	13
Intended drawing size letter:		S	14
		S	15
Number of drawing sheets in the file:		S	16
		S	17
Data organization method with contents of each level:		S	18
		S	19
IGES Subsets Version 1.00		S	20
		S	21
CONTRACT:		S	22
		S	23

```
             DRAWING:                                              S    24
               SHEET:  1                                           S    25
                                                                   S    26
         CONFORMANCE:  IGES 4.0                                    S    27
                                                                   S    28
              SOURCE:  IBM CADAM RELEASE  V3R1M1                    S    29
                       IBM IGES PROCESSOR V2R3M0                    S    30
                                                                   S    31
        GENERATED BY:  MAGNAVOX ELECTRONIC SYSTEMS COMPANY          S    32
                       1313 PRODUCTION ROAD                         S    33
                       FORT WAYNE, IN  46808                        S    34
                                                                   S    35
DRAWING CONTACT:                                                    S    36
   IGES CONTACT:                                                    S    37
                                                                   S    38
            COMMENTS:  THIS DRAWING IS TO TEST VENDORS CAPABILITY TO S   39
                       TRANSFORM IGES 4.0 INTO CALS MIL-D-28000A    S    40
                       CLASS II.                                    S    41
                                                                   S    42
```

*** Global Section From Input File:

```
,,22HGenerate_Subset_In.igs,30H/users/meh/magnovox/sht1.cals2,15HIBM CADG   1
AM R21.3,30HIBM IGES Processor V2R3 (1991),32,38,6,308,15,,1.0D0,1,4HINCG   2
H,80,0.08D0,13H920116.171047,0.001D0,,11HMX DESIGNER,35HMAGNAVOX ELECTROG   3
NIC SYSTEMS COMPANY,8,,;                                            G       4
```

*** File and Product Name Information ***

```
    File name from sender    = '/users/meh/magnovox/sht1.cals2'
    File creation Date.Time   = '920116.171047'
*   Model change Date.Time    = ''
    Author                    = 'MX DESIGNER'
    Department                = 'MAGNAVOX ELECTRONIC SYSTEMS COMPANY'
    Product name from sender = 'Generate_Subset_In.igs'
*   Destination product name = ''
```

*** Parameter Delimiters ***

```
*   Delimiter  = ','
*   Terminator = ';'
```

*** Originating System Data ***

```
    System ID                = 'IBM CADAM R21.3'
    Preprocessor version = 'IBM IGES Processor V2R3 (1991)'
```

Specification version = 8 (IGES 5.0)

*** Precision Levels ***

    Integer bits =   32
    Floating point - Exponent =   38 Mantissa =   6
    Double precision - Exponent =   308 Mantissa =   15

*** Global Model Data ***

    Model scale   = 1.0000E+000
    Unit flag   = 1
    Units   = 'INCH'
    Line weights   = 80
    Maximum line thickness = 8.000000E-002
    Minimum line thickness = 1.000000E-003
    Granularity   = 1.000000E-003
*   Maximum coordinate   = 0.000000E+000
ERROR   3008: CALS Class II does not allow maximum coordinate to be defaulted.
CAUTION 1080: Maximum coordinate value in data is to be zero.

*   Drafting standard applicable to original data is not specified.

** 6 defaulted Global values.
    (*) Indicates a defaulted value.

****
*** Entity Parsing Messages ***
****

  ** 2552 defaulted Parameter data values.

*** Message Summary ***

1019: 1 Invalid Global parameters.
3001: 1 Illegally defaulted global values.

*** Error Summary ***

    0 fatal errors
    0 severe errors
    1 errors
    0 warnings
    1 cautions
    0 nitpicks
    0 notes

*** Completed Parsing of \mag\cals21.igs ***

9.2 IDA Verify Log

*** IGES DATA FILE ANALYSIS ***

```
        ***        AUGUST 1991        ***
        ***    IGES Data Analysis    ***
        ***      (708) 449-3430      ***
```

Input file is \mag\cals21.igs

Checking for conformance to CALS Class II

Today is February 10, 1992   9:22 AM

*** File and Product Name Information ***

```
    File name from sender    = '/users/meh/magnovox/sht1.cals2'
    File creation Date.Time   = '920116.171047'
    Model change Date.Time    = ' '
    Author                    = 'MX DESIGNER'
    Department                = 'MAGNAVOX ELECTRONIC SYSTEMS COMPANY'
    Product name from sender = 'Generate_Subset_In.igs'
    Destination product name = ' '
```

*** Parameter Delimiters ***

```
    Delimiter  = ','
    Terminator = ';'
```

*** Originating System Data ***

```
    System ID              = 'IBM CADAM R21.3'
    Preprocessor version  = 'IBM IGES Processor V2R3 (1991)'
    Specification version = 8 (IGES 5.0)
ERROR   4048: Illegal specification version for CALS Class II specified.
```

*** Precision levels ***
```
    Integer bits =     32
    Floating point  -  Exponent =    38  Mantissa =     6
    Double precision - Exponent =   308  Mantissa =    15
```

*** Global Model Data ***

```
    Model scale               = 1.0000E+000
    Unit flag                 = 1
    Units                     = 'INCH'
    Line weights              = 80
    Maximum line thickness = 8.000000E-002
    Minimum line thickness = 1.000000E-003
```

Granularity   = 1.000000E-003
Maximum coordinate   = 0.000000E+000
CAUTION 2316: Maximum coordinate value in data is to be zero.

Drafting standard applicable to original data is not specified.

*** Status Flag Summary ***

Blank status: Visible   1280
              Blanked   6

Independence: Independent   53
              Physically Subordinate   543
              Logically Subordinate   690
              Totally Subordinate   0

Entity use: Geometry   49
              Annotation   967
              Definition   244
              Other   26
              Logical/Positional   0
              2D parametric   0
              Not Specified   0

Hierarchy: Structure DE applies   498
              Subordinate DE applies   788
              Hierarchy property applies   0
              Not Specified   0

*** Entity Occurrence Counts ***

Entity	Form	Level	Count	Type
100	0	0	47	Circular arc
106	40	0	114	Witness line
106	63	0	5	Simple closed planar curve
110	0	0	411	Line
112	0	0	7	Parametric spline curve
116	0	0	8	Point
124	0	0	38	Transformation matrix
210	0	0	18	General label
212	0	0	170	General note
212	5	0	1	General note - super-/sub-scripted dimension
214	1	0	134	Leader arrow - Wedge
214	3	0	26	Leader arrow - Filled triangle
216	0	0	57	Linear dimension
230	0	0	5	Sectioned area (Standard Crosshatching)

308	0	0	26	Subfigure definition
314	0	0	1	Color definition
402	7	0	26	Group without back-pointers instance
404	0	0	1	Drawing
406	15	0	10	Property - Name
406	16	0	1	Property - Drawing size
406	17	0	1	Property - Drawing units
408	0	0	170	Single subfigure instance
410	0	0	9	View - Orthographic parallel

*** Entity Count by Level ***

Level	Count
0	1286

*** Labeling Information ***

0% of the entities are labeled.

Unlabeled   1286

*** Line Fonts Used in Data ***

100	102	104	106	108	110	112	114	
-	-	-	-	-	-	-	-	Undefined
20	-	-	119	-	257	7	-	Solid
21	-	-	-	-	119	-	-	Dashed
6	-	-	-	-	7	-	-	Phantom
-	-	-	-	-	28	-	-	Center-line
-	-	-	-	-	-	-	-	Dotted
-	-	-	-	-	-	-	-	User defined

116	118	120	122	124	125	126	128	
-	-	-	-	38	-	-	-	Undefined
8	-	-	-	-	-	-	-	Solid
-	-	-	-	-	-	-	-	Dashed
-	-	-	-	-	-	-	-	Phantom
-	-	-	-	-	-	-	-	Center-line
-	-	-	-	-	-	-	-	Dotted
-	-	-	-	-	-	-	-	User defined

130	132	134	136	138	140	142	144	
-	-	-	-	-	-	-	-	Undefined
-	-	-	-	-	-	-	-	Solid
-	-	-	-	-	-	-	-	Dashed

```
-    -    -    -    -    -    -    -    Phantom
-    -    -    -    -    -    -    -    Center-line
-    -    -    -    -    -    -    -    Dotted
-    -    -    -    -    -    -    -    User defined
```

*** Line Widths Used in Data ***

Weight	Count	Width
Defaulted	821	(0.0010)
13	376	(0.0130)
11	89	(0.0110)

*** Colors Used in Data ***

Defaulted	1251	
Red	1	
User	34	

```
******************************
******  ENTITY ANALYSIS  ******
******************************
```

*** Entity type: 100

*** Entity type: 106

*** Entity type: 110

   --   411 lines averaging 2.443556E+000 units --

*** Entity type: 112

*** Entity type: 116

*** Entity type: 124

38 transformation matrices, 18 non-zero translations.
NOTE   2341: 18 matrices contain translation information.

*** Entity type: 210

*** Entity type: 212

    229 text strings in data file.
    Average text aspect ratio in file is 0.9137364.
    Minimum text aspect ratio in file is 0.7142840.
    Maximum text aspect ratio in file is 0.9904738.

    FONTS USED IN FILE

    FONT   COUNT   NAME

       1   224   Default ASCII Style
   1002   1   Symbol Font 2
   1003   4   Drafting Font

*** Entity type: 214

    Average arrow aspect ratio in file is 2.7086538.
    Minimum arrow aspect ratio in file is 2.0000000.
    Maximum arrow aspect ratio in file is 2.8461538.

*** Entity type: 216

*** Entity type: 230

*** Entity type: 308

  Subfigure name at D   1705: 'D1,MX/ITI/CTN TEST 1'.
    Number of included entities = 13.
  Subfigure name at D   1733: 'D2,MX/ITI/CTN TEST 1'.
    Number of included entities = 8.
  Subfigure name at D   1751: 'D3,MX/ITI/CTN TEST 1'.

<<<<< *PART OF LOG REMOVED HERE* >>>>>

  Subfigure name at D   2173: 'D26,MX/ITI/CTN TEST 1'.
    Number of included entities = 8.

*** Entity type: 314

  Color specified at D   365 is named 'COLOR 1'.
    Default color substitute is red.

*** Entity type: 402

ERROR   4042: Illegal form for CALS Class II specified at D   1653.
ERROR   4042: Illegal form for CALS Class II specified at D   1655.

ERROR   4042: Illegal form for CALS Class II specified at D   1657.
ERROR   4042: Illegal form for CALS Class II specified at D   1659.
ERROR   4042: Illegal form for CALS Class II specified at D   1661.
ERROR   4042: Illegal form for CALS Class II specified at D   1663.
ERROR   4042: Illegal form for CALS Class II specified at D   1665.
ERROR   4042: Illegal form for CALS Class II specified at D   1667.
ERROR   4042: Illegal form for CALS Class II specified at D   1669.
ERROR   4042: Illegal form for CALS Class II specified at D   1671.
ERROR   4042: Messages regarding form numbers suppressed.

 *** Entity type: 404

Drawing at D   1627 contains 9 views.
Drawing at D   1627 contains 0 annotation entities.

 *** Entity type: 406

 *** Entity type: 408

   Subfigure instance at D   2191 references subfigure at D   1705.
   Subfigure instance at D   2193 references subfigure at D   1751.
   Subfigure instance at D   2195 references subfigure at D   1751.
   Subfigure instance at D   2197 references subfigure at D   1751.
   Subfigure instance at D   2199 references subfigure at D   1751.

                  <<<<< *PART OF LOG REMOVED HERE* >>>>>

   Subfigure instance at D   2565 references subfigure at D   1773.
   Subfigure instance at D   2569 references subfigure at D   1773.
   Subfigure instance at D   2571 references subfigure at D   1977.

 *** Entity type: 410

   Scale of view at D   3 is 1.000000E+000.
Orthographic View entity at D   3 has 0 clipping planes specified.
     XMIN = Not Set   XMAX = Not Set
     YMIN = Not Set   YMAX = Not Set
     ZMIN = Not Set   ZMAX = Not Set

   Scale of view at D   53 is 1.000000E+000.
Orthographic View entity at D   53 has 0 clipping planes specified.
     XMIN = Not Set   XMAX = Not Set
     YMIN = Not Set   YMAX = Not Set
     ZMIN = Not Set   ZMAX = Not Set

   Scale of view at D   115 is 1.000000E+000.
Orthographic View entity at D   115 has 0 clipping planes specified.
     XMIN = Not Set   XMAX = Not Set

```
   YMIN = Not Set        YMAX = Not Set
   ZMIN = Not Set        ZMAX = Not Set

   Scale of view at D     157 is 1.000000E+000.
Orthographic View entity at D     157 has  0 clipping planes specified.
   XMIN = Not Set        XMAX = Not Set
   YMIN = Not Set        YMAX = Not Set
   ZMIN = Not Set        ZMAX = Not Set

   Scale of view at D     193 is 2.000000E+000.
Orthographic View entity at D     193 has  0 clipping planes specified.
   XMIN = Not Set        XMAX = Not Set
   YMIN = Not Set        YMAX = Not Set
   ZMIN = Not Set        ZMAX = Not Set

   Scale of view at D     209 is 1.000000E+000.
Orthographic View entity at D     209 has  0 clipping planes specified.
   XMIN = Not Set        XMAX = Not Set
   YMIN = Not Set        YMAX = Not Set
   ZMIN = Not Set        ZMAX = Not Set

   Scale of view at D     219 is 2.000000E+000.
Orthographic View entity at D     219 has  0 clipping planes specified.
   XMIN = Not Set        XMAX = Not Set
   YMIN = Not Set        YMAX = Not Set
   ZMIN = Not Set        ZMAX = Not Set

   Scale of view at D     231 is 1.000000E+000.
Orthographic View entity at D     231 has  0 clipping planes specified.
   XMIN = Not Set        XMAX = Not Set
   YMIN = Not Set        YMAX = Not Set
   ZMIN = Not Set        ZMAX = Not Set

   Scale of view at D     357 is 1.000000E+000.
Orthographic View entity at D     357 has  0 clipping planes specified.
   XMIN = Not Set        XMAX = Not Set
   YMIN = Not Set        YMAX = Not Set
   ZMIN = Not Set        ZMAX = Not Set


 *** Message Summary ***

4011: 1 Problems in the Global section
4019: 26 Entities with illegal form

 *** Error Summary ***

   0 fatal errors
   0 severe errors
```
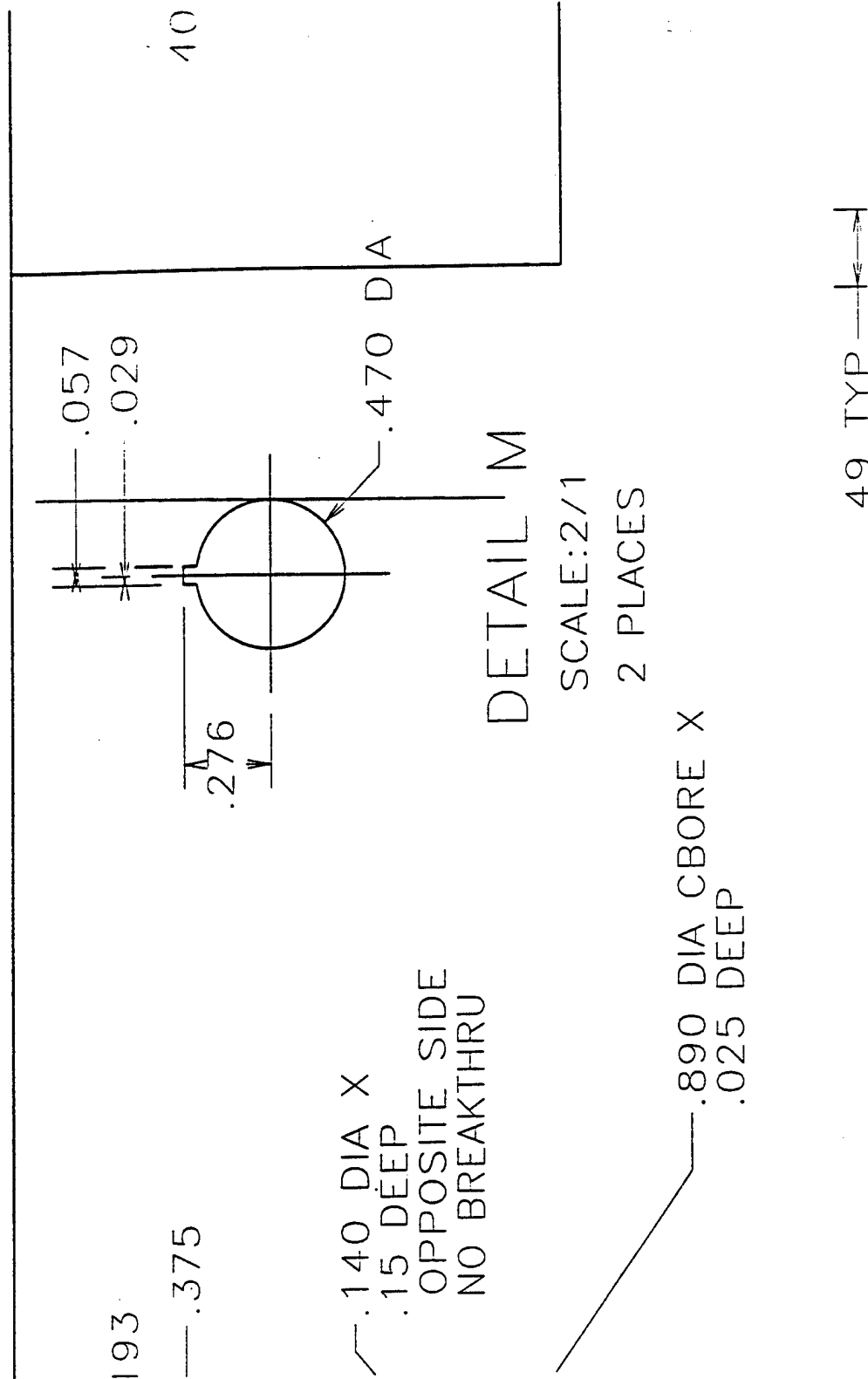
27 errors
0 warnings
1 cautions
0 nitpicks
1 notes

*** End of Analysis of \mag\cals21.igs ***

9.3 ArrowHead Details
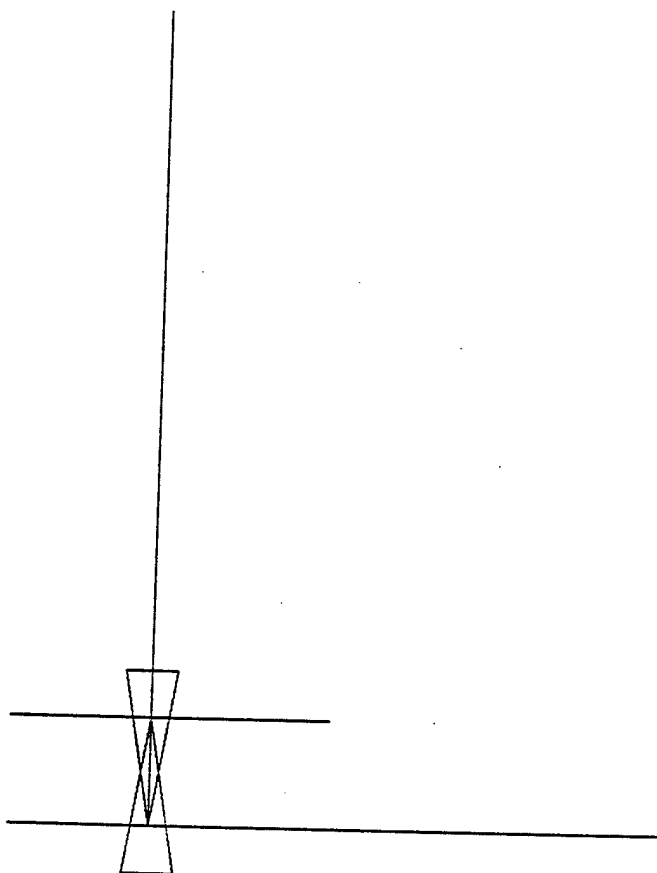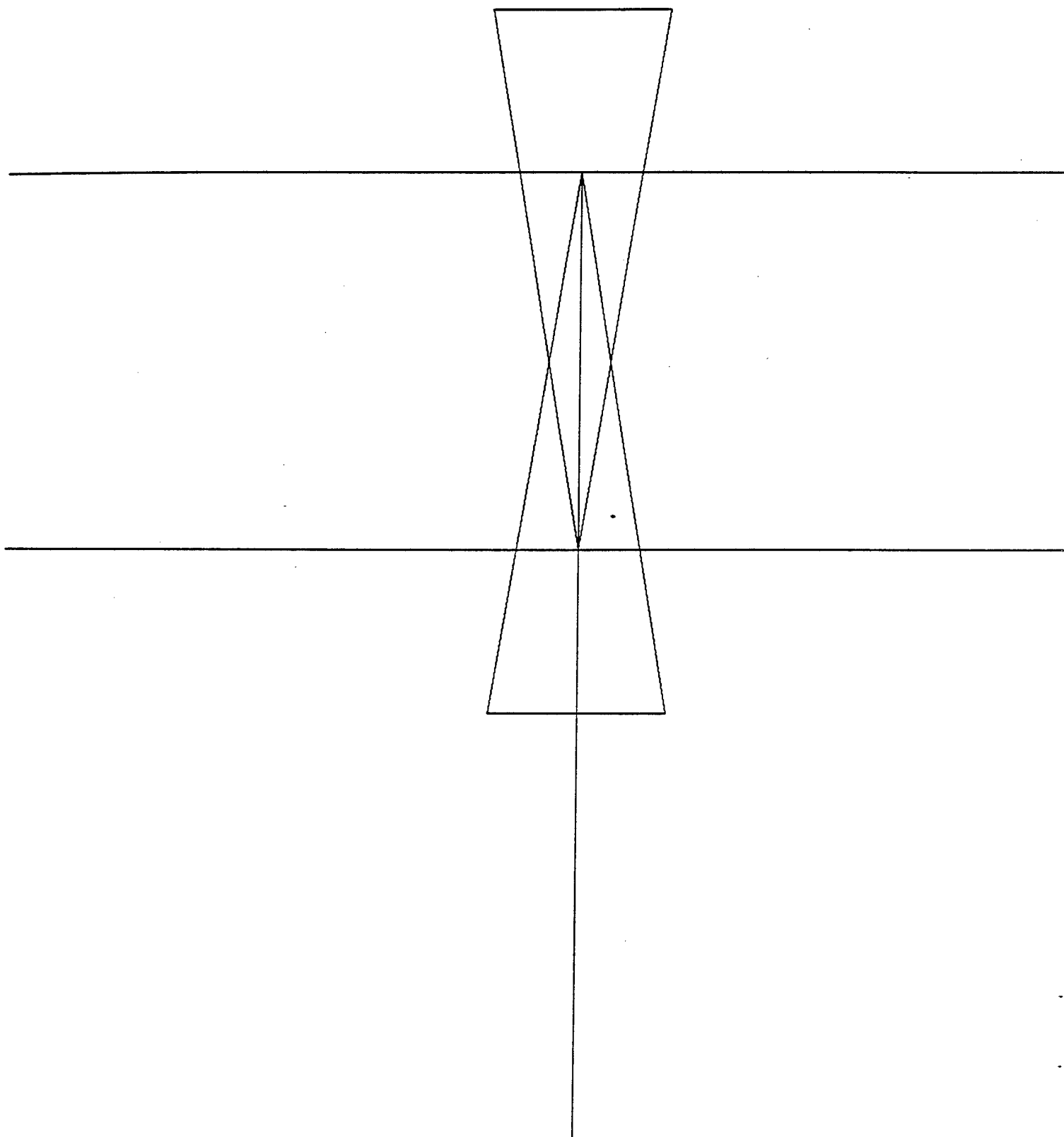
9.3.1 Preview Detail

.057
.029
.470 DIA

10

.193
.375
.276

.140 DIA X
.15 DEEP
OPPOSITE SIDE
NO BREAKTHRU

.890 DIA CBORE X
.025 DEEP

DETAIL M

SCALE:2/1

2 PLACES

49 TYP

9.3.2 Cadkey Detail of Breakout

9.3.3 Cadkey Detail of Arrowheads
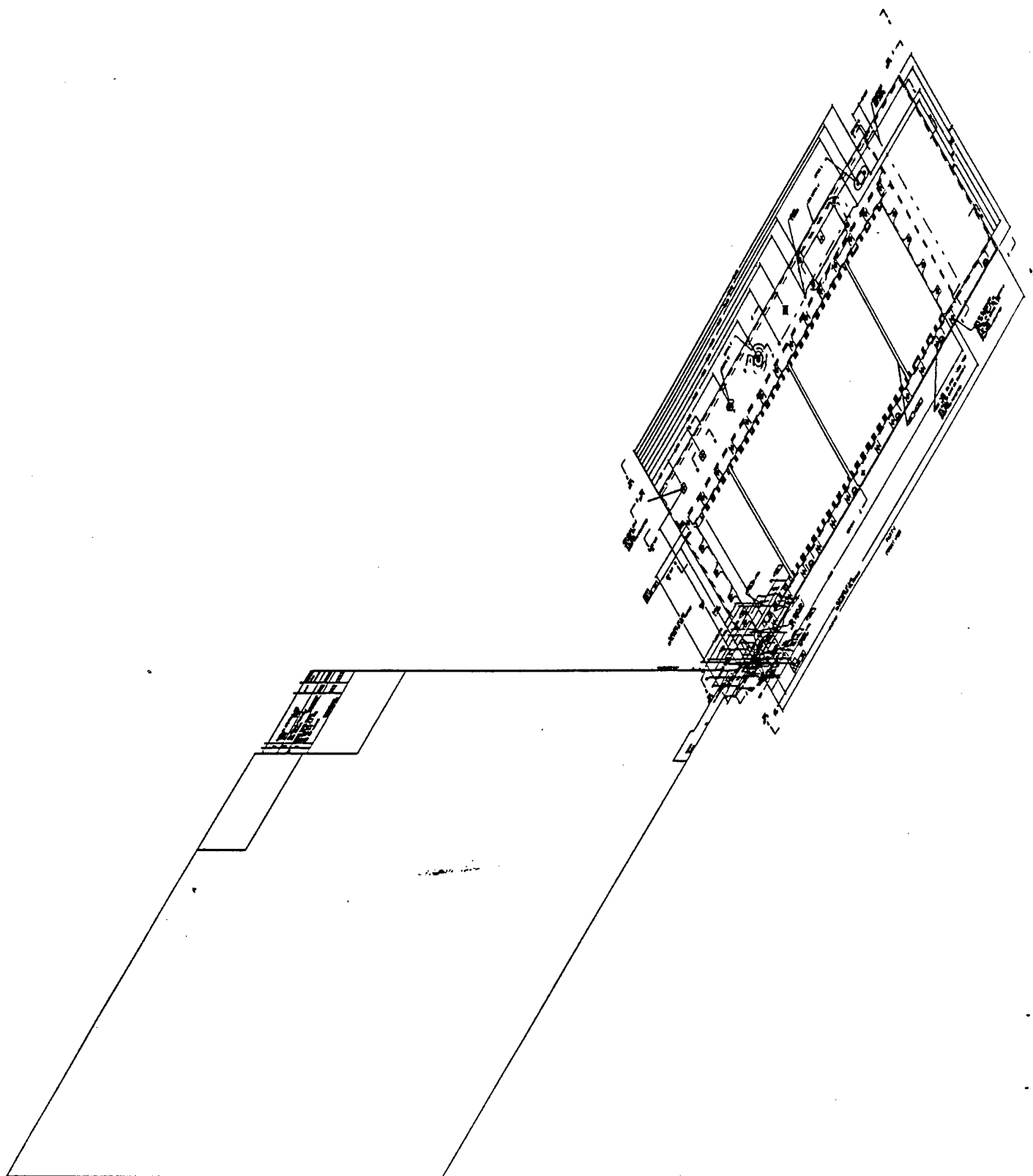
9.3.4 Details of Point Coordinates

X -12.20591
Y 27.59039

X -12.05791
Y 27.61639

X -12.05791
Y 27.56439

X -12.09191
Y 27.59039
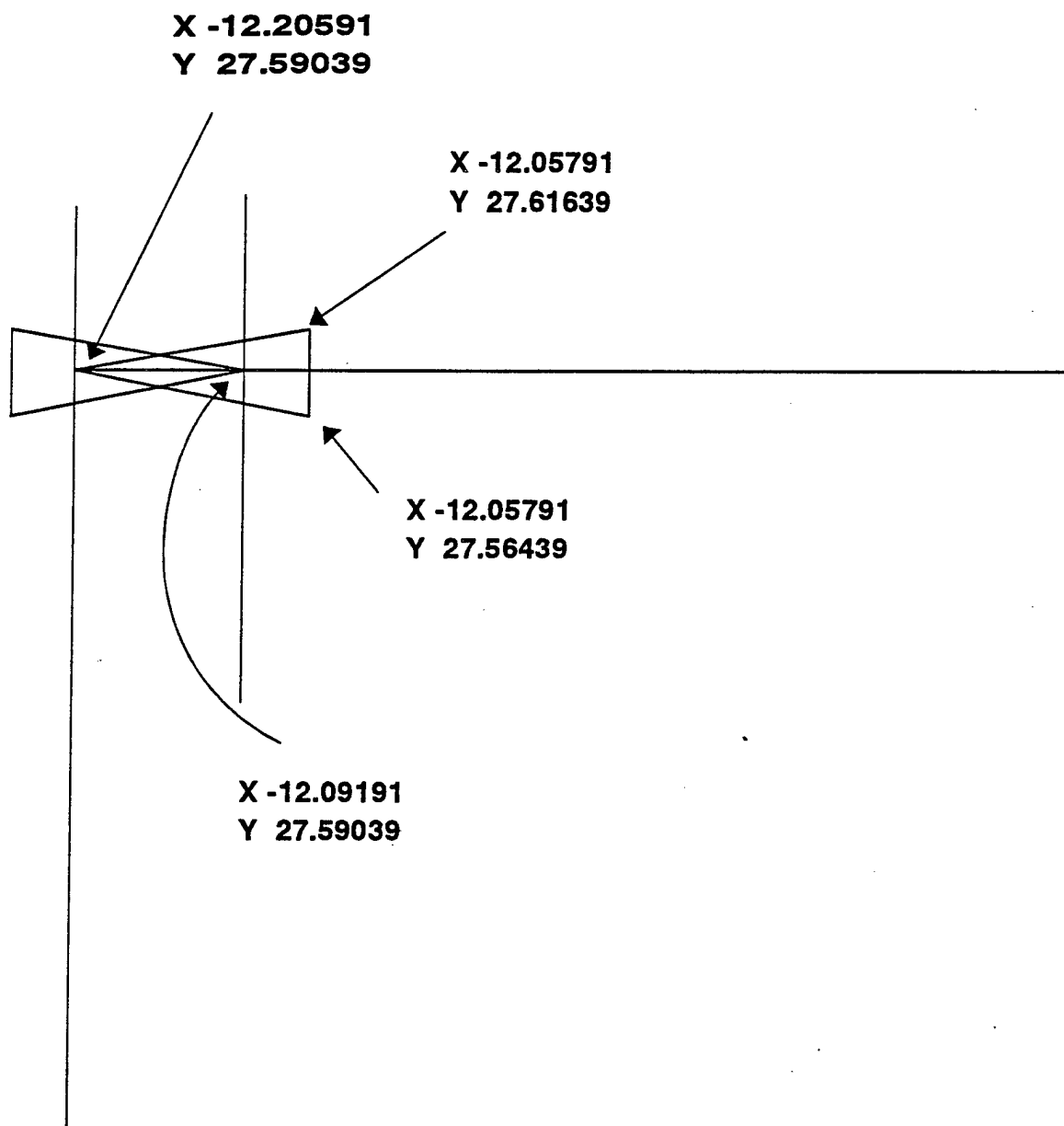
9.4 Hard Copy

9.4.1 IGESView

PART-1
FRONT VIEW

9.4.2 Preview Model Mode

9.4.3 Preview Layout Mode
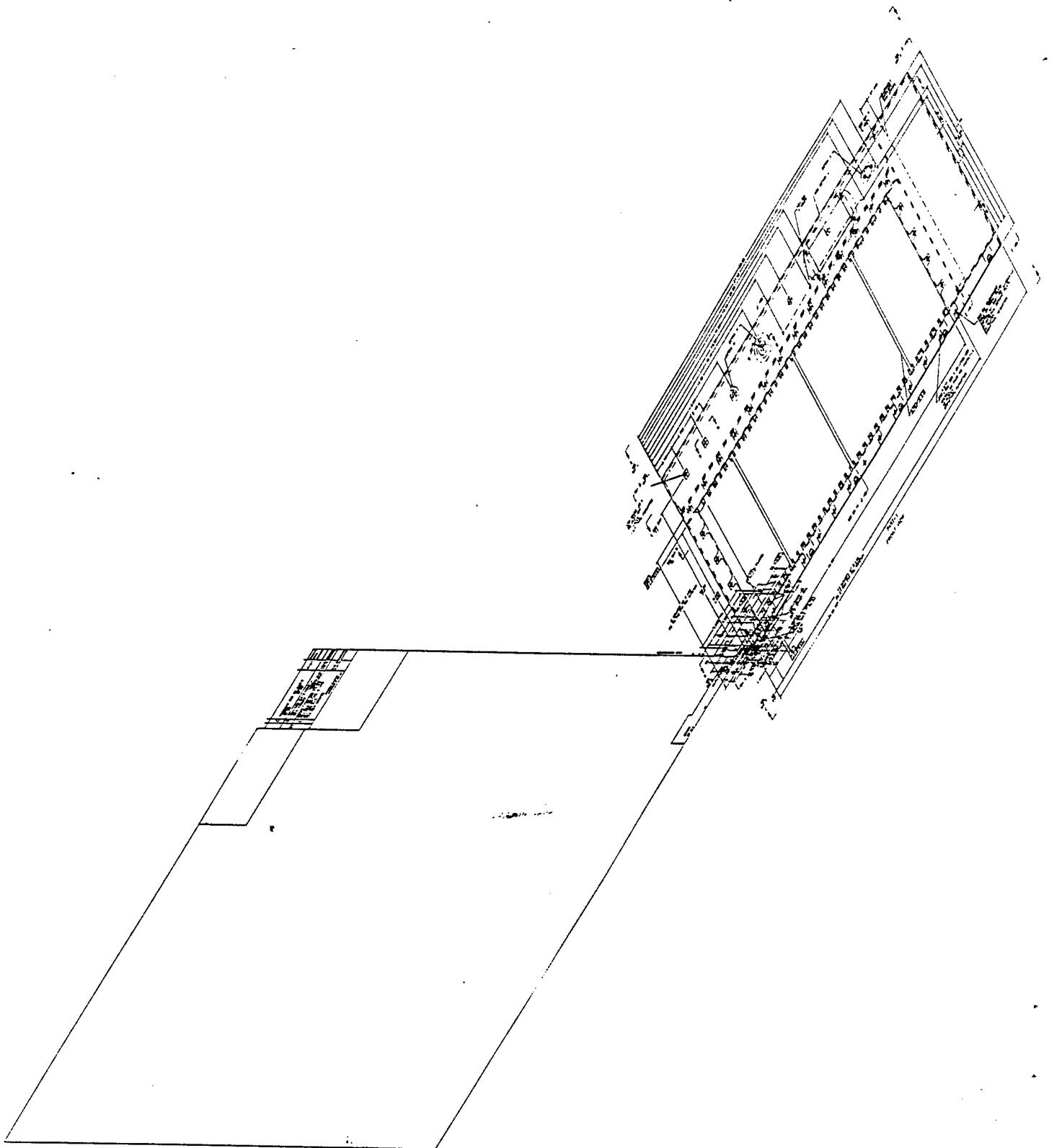
9.4.4 Cadkey

9.4.5 AutoCAD
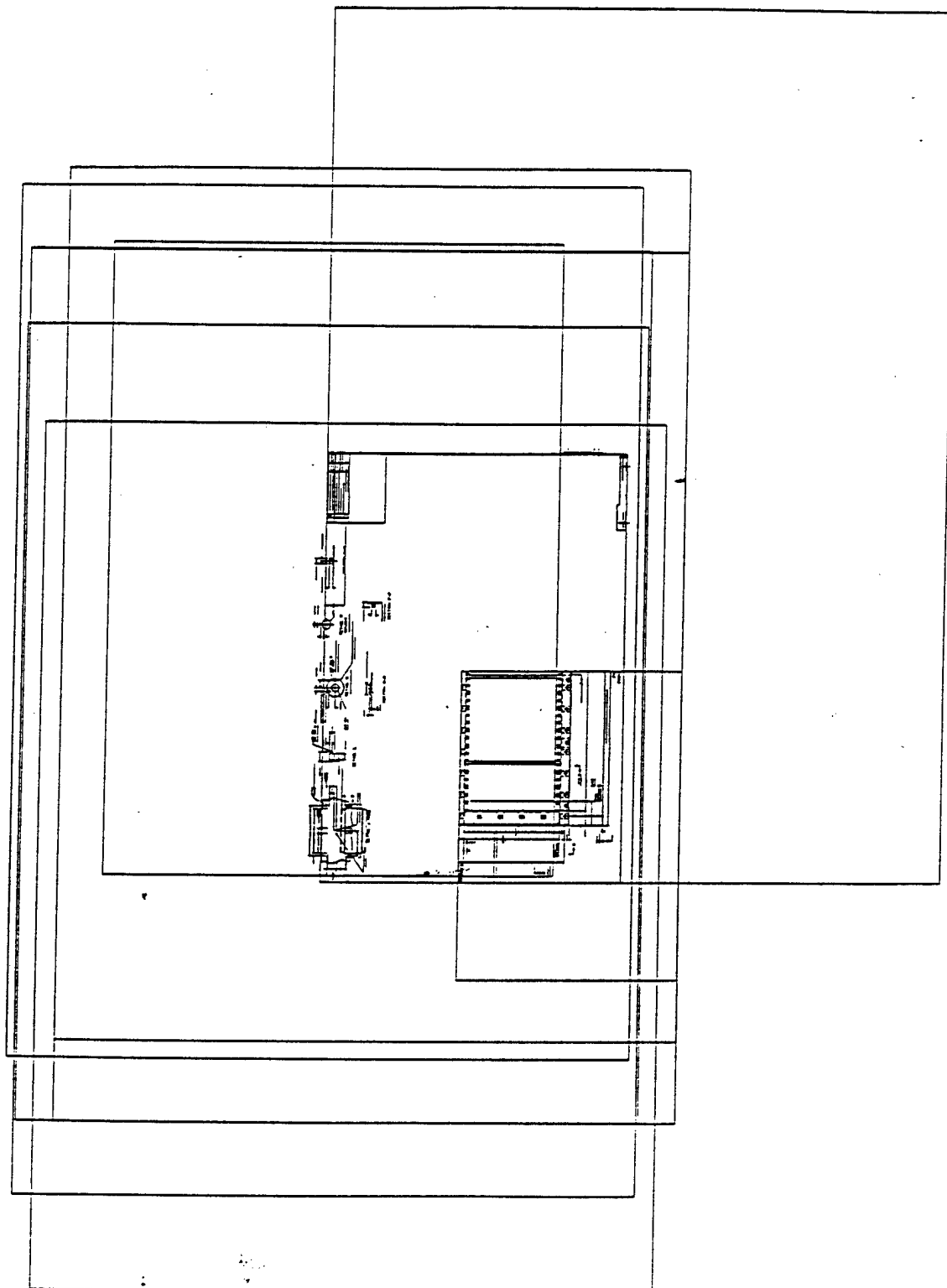
9.4.6 CheckMark

9.5 IGES File Two

9.5.1 Preview

9.6 IGES File Three

9.6.1 Preview

9.7 IGES File Four

9.7.1 Preview